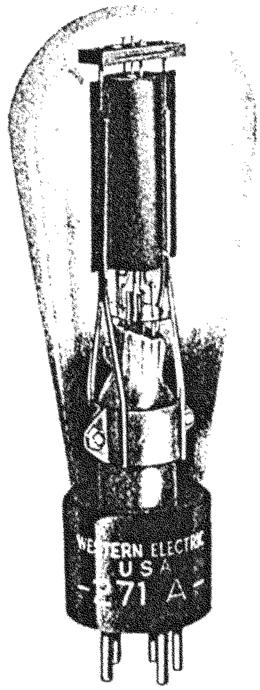
Western Electric

271A Vacuum Tube



Classification—Moderate-power triode with indirectly heated cathode

Applications

Audio-frequency amplifier or modulator where outputs up to about 3 watts are required.

Radio-frequency power amplifier.

Oscillator.

Dimensions—Dimensions, outline diagrams of the tube and base, and the arrangement of the electrode connections to the base terminals are shown in Figures 1 and 2.

Base—Medium, five-pin type.

Socket—Standard, five-contact type such as the Western Electric 141A socket.

Mounting Positions—The 271A tube may be mounted in any position.

Average Direct Interelectrode Capacitances

Grid to plate	5.3 $\mu\mu$f.
Grid to heater and cathode	6.5 $\mu\mu$f.
Plate to heater and cathode	3.8 $\mu\mu$f.

Heater Rating

Heater voltage	5.0 volts, a.c. or d.c.
Nominal heater current	2.0 amperes

The heater element of this tube is designed to operate on a voltage basis and should be operated at as near the rated voltage as is practicable.

Cathode Connection—When the heater is operated on alternating current, a minimum level of hum in the tube can usually be obtained by connecting the cathode either directly to the heater at terminal 5, shown in Figure 2, or to a center tap on the secondary of the filament transformer. This minimum hum level is approximately 30 decibels lower than for a well designed filamentary tube of similar characteristics. If voltage must be applied between the heater and cathode, it should be kept as low as possible and should never exceed 90 volts.

Characteristics—Plate current characteristics of a typical 271A tube are shown in Figure 3 as functions of grid voltage for several values of plate voltage. Similar characteristics as functions of plate voltage for several values of grid voltage are shown in Figure 4. Amplification factor, plate resistance, and transconductance characteristics corresponding to the plate current characteristics of Figure 3 are given in Figures 5, 6, and 7, respectively.

Limiting Conditions for Safe Operation

Maximum plate voltage	450 volts
Maximum plate current	60 milliamperes
Maximum instantaneous grid potential on positive swing of input voltage	+20 volts

Operating Conditions and Output—Permissible operating conditions are included within the area, ABCD, in Figure 3. Amplification factor, plate resistance, transconductance, and performance data are listed in the table on page 3 for typical operating conditions represented by selected points within this area. Less severe operating conditions should be selected in preference to maximum operating conditions wherever possible. The life of the tube at maximum conditions may be shorter than at less severe conditions.

The performance data include the fundamental power output, P_m, in watts, and the second and third harmonic levels, F_{2m} and F_{3m}, in decibels below the fundamental for the indicated values of load resistance and input voltage. The peak value of the sinusoidal input voltage, E_{gm}, is numerically equal to the grid bias for each operating condition. For a smaller input voltage, E_g, the output and harmonic levels are given approximately by the following relations:

$$P = P_m \left(\frac{E_g}{E_{gm}}\right)^2$$

$$F_2 = F_{2m} + 20 \log_{10} \frac{E_{gm}}{E_g}$$

$$F_3 = F_{3m} + 40 \log_{10} \frac{E_{gm}}{E_g}$$

TABLE

Plate Voltage	Grid Bias	Plate Current	Amplification Factor	Plate Resistance	Transconductance	Input Voltage	Load Resistance	Power Output	Second Harmonic	Third Harmonic
Volts	Volts	Milliamperes		Ohms	Micromhos	Peak Volts	Ohms	Watts	db	db
300	−25	19.5	8.2	3650	2250	25	7300	1.3	23	50
							14600	0.9	27	55
350	−30	21.5	8.1	3550	2300	30	7100	1.9	22	48
							14200	1.4	27	55
350	−25	34.5	8.4	2850	2930	25	2850	1.9	20	47
							5700	1.7	25	70
							11400	1.3	29	50
350	−20	51.0	8.6	2460	3500	20	2460	1.6	24	70
							4920	1.4	28	55
							9840	1.0	31	50
400	−35	24.5	8.1	3450	2350	35	6000	2.8	20	43
							8000	2.5	22	50
							10000	2.3	24	60
							15000	1.9	27	55
400	−30	37.5	8.3	2830	2920	30	4000	2.8	22	50
							6000	2.4	25	70
							8000	2.2	27	55
							10000	1.9	28	55
							15000	1.5	30	50
400	−25	54.0	8.5	2450	3480	25	3000	2.3	24	70
							4000	2.2	26	55
							6000	1.9	28	50
							8000	1.7	30	50
							12000	1.3	32	50
*450	−30	57.5	8.5	2450	3480	30	2450	3.4	22	50
							4900	3.1	30	60

*Maximum operating conditions.

Curves showing the variation of power output and harmonic levels with load resistance for several values of operating plate current are given in Figures 8, 9, and 10 for a plate voltage of 400 volts. The sharp minima which appear in the third harmonic curves are characteristic of the 271A tube, but their positions may be different for different tubes. For this reason, the third harmonic level in any individual tube may be widely different from the value given in the table where the operating condition under consideration is near one of these minima. Near these points, also, the expression given above for third harmonic level is not reliable.

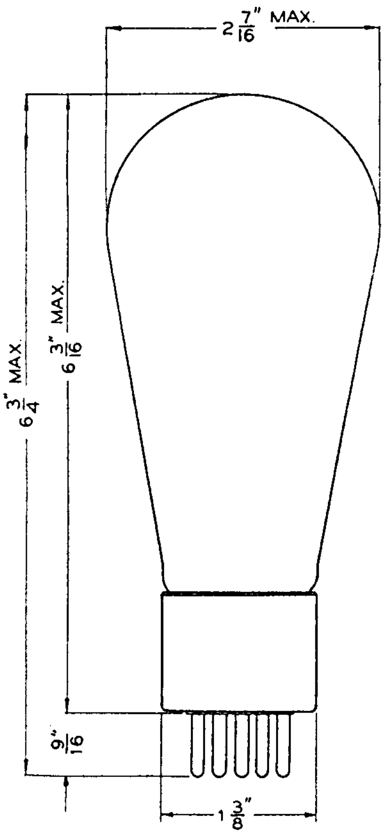


FIG. 1

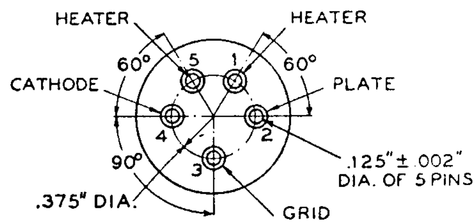


FIG. 2

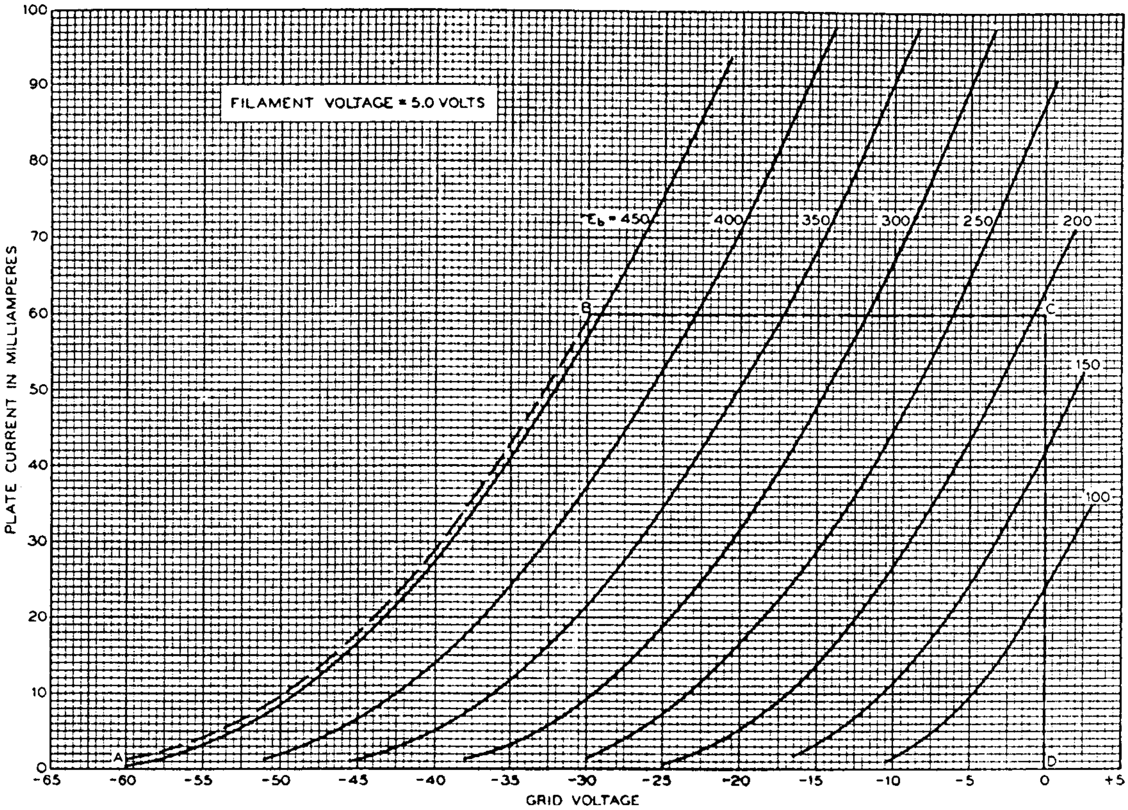

FILAMENT VOLTAGE = 5.0 VOLTS
PLATE CURRENT IN MILLIAMPERES
GRID VOLTAGE
E_b = 450
400
350
300
250
200
150
100
A
B
C
D
100
90
80
70
60
50
40
30
20
10
0
-65
-60
-55
-50
-45
-40
-35
-30
-25
-20
-15
-10
-5
0
+5

FIG. 3

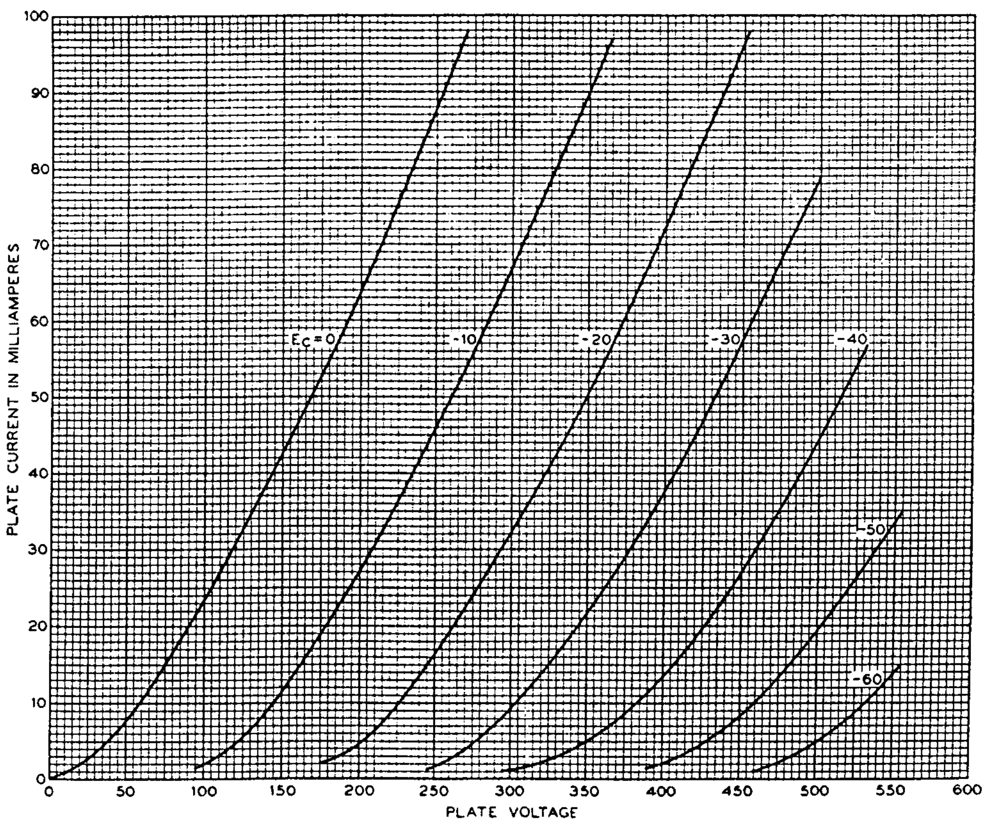

PLATE CURRENT IN MILLIAMPERES
PLATE VOLTAGE
E_C = 0
-10
-20
-30
-40
-50
-60
100
90
80
70
60
50
40
30
20
10
0
0
50
100
150
200
250
300
350
400
450
500
550
600

FIG. 4

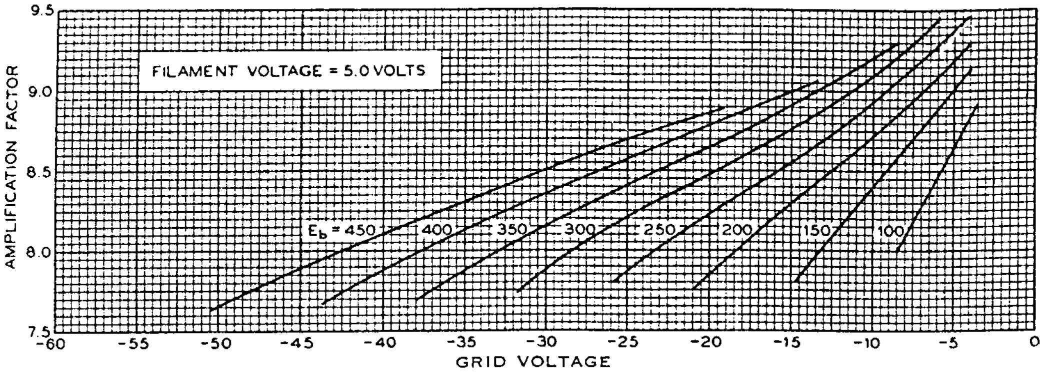


FIG. 5

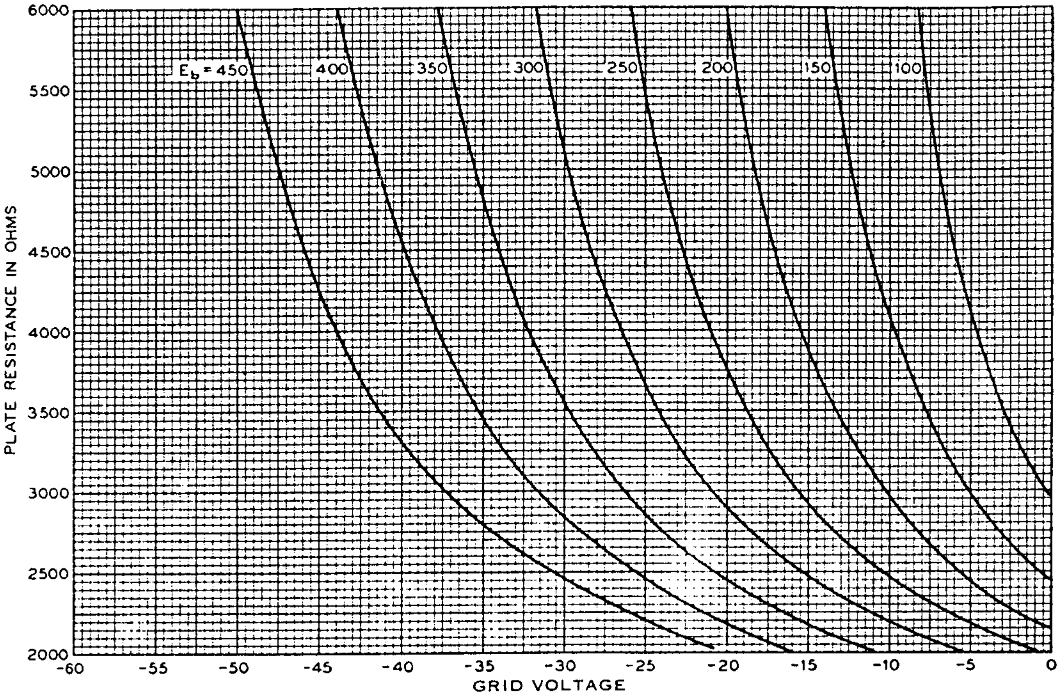


FIG. 6

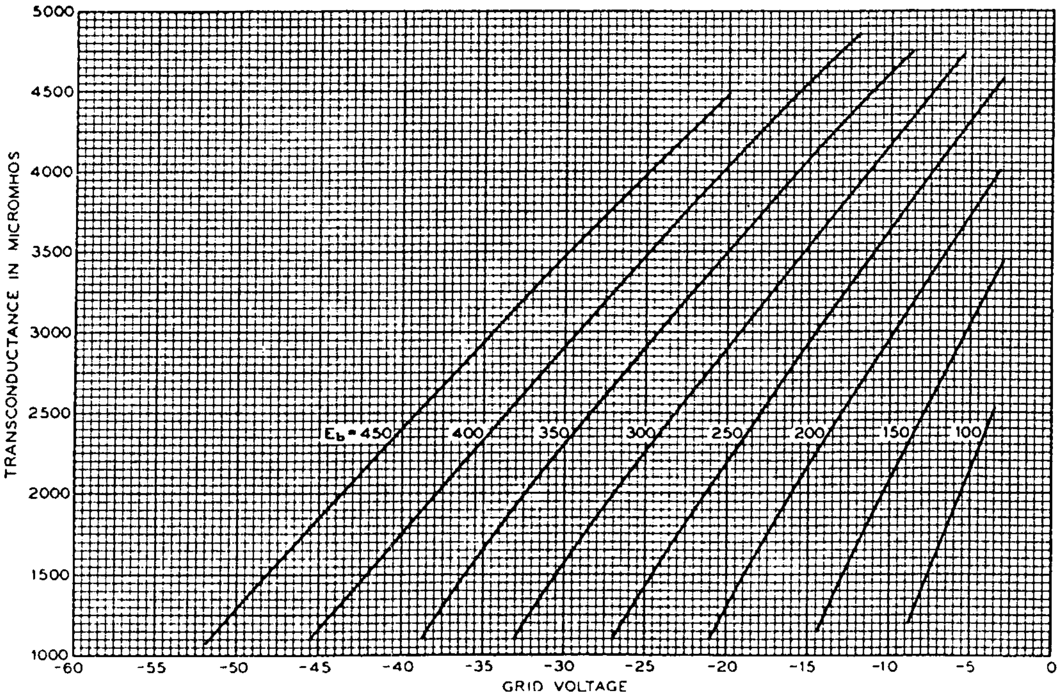


FIG. 7

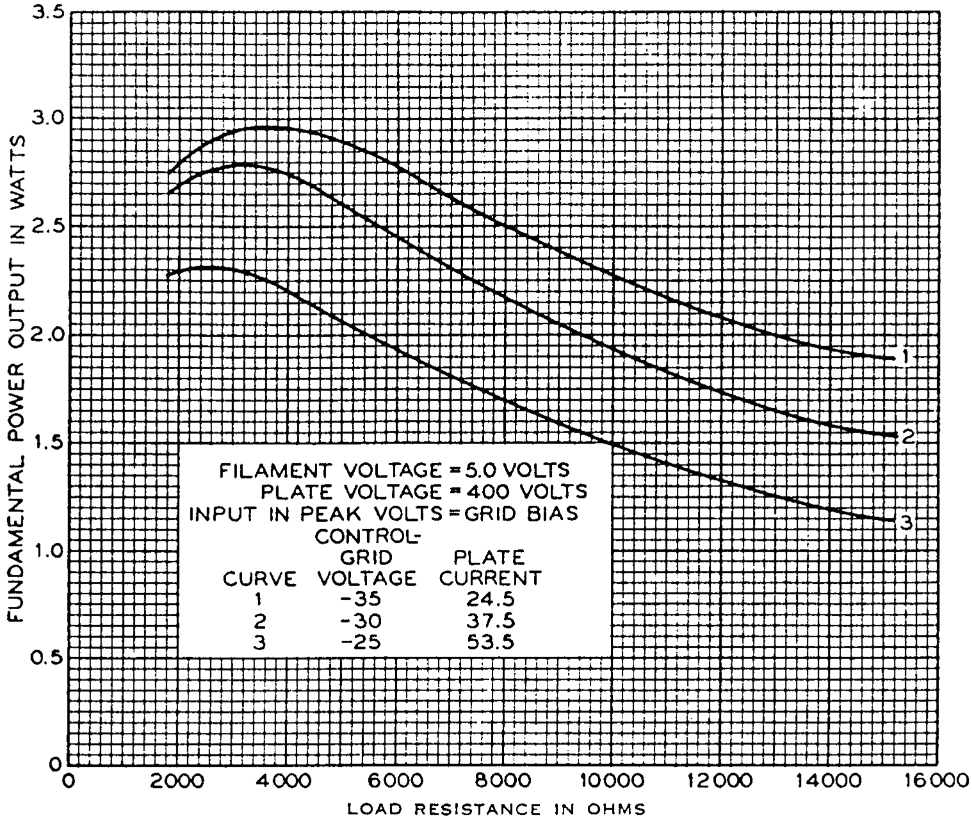

FUNDAMENTAL POWER OUTPUT IN WATTS
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
2000
4000
6000
8000
10000
12000
14000
16000
LOAD RESISTANCE IN OHMS
FILAMENT VOLTAGE = 5.0 VOLTS
PLATE VOLTAGE = 400 VOLTS
INPUT IN PEAK VOLTS = GRID BIAS
CURVE
CONTROL-GRID VOLTAGE
PLATE CURRENT
1
-35
24.5
2
-30
37.5
3
-25
53.5
1
2
3

FIG. 8

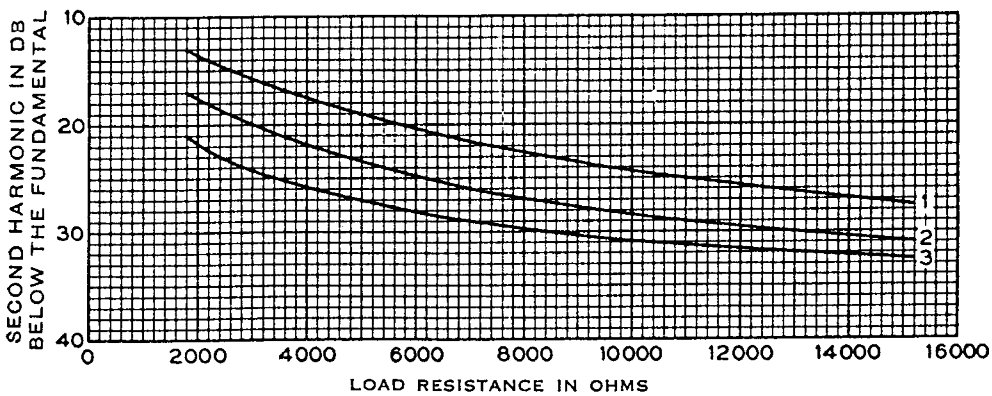

SECOND HARMONIC IN DB BELOW THE FUNDAMENTAL
10
20
30
40
0
2000
4000
6000
8000
10000
12000
14000
16000
LOAD RESISTANCE IN OHMS
1
2
3

FIG. 9

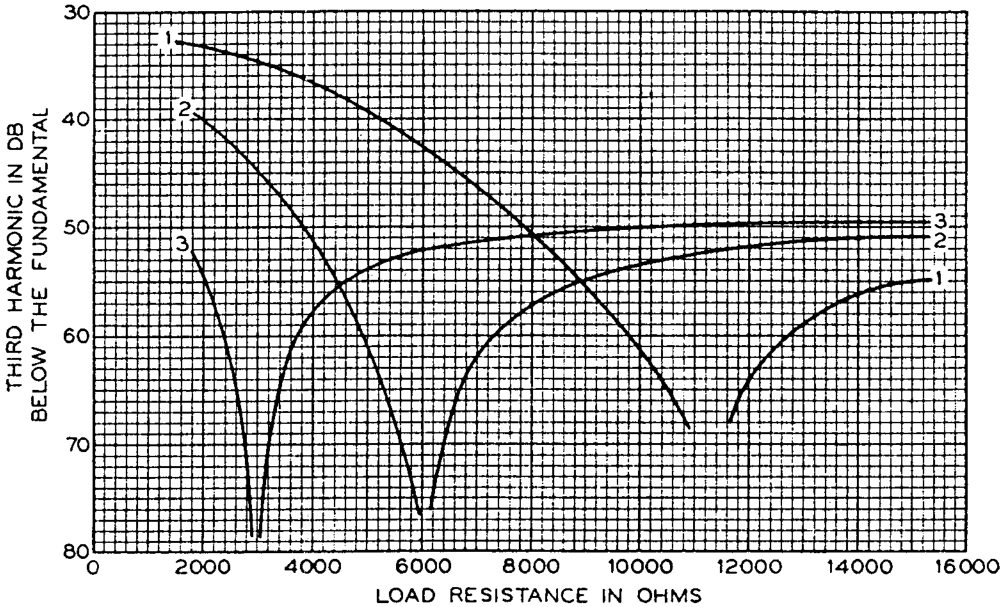


FIG. 10

1-C-36-55C
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